Fowls by prolonged feeding with polished rice undergo progressive degeneration of medullated nerve fibres. This shows as progressive paralysis. These nerves regenerate with adequate diet. The nerve fibres are intact during the whole time; there are no wounds or inflammations; and no inwandering fibres from other nerves. The writer secured degeneration and regeneration without any trace of multiplication of the nuclei of the neurilemma sheath which has been interpreted by many to mean the formation of embryonic nerve fibres and auto-regeneration.

By prolonging the degenerative process the writer secured instances of multiplication of the nuclei in sheath. He believes that the so called embryonic fibres are degenerative phenomena, and not regenerative. In total absence of "embryonic nerve fibres" new axis cylinders grew peripherally down the old medullary sheath, passing alongside remnants of the old axis within the sheath.

BEHAVIOR OF NUCLEUS IN CRYSTAL-FORMATION.

Samuels (Compt. Rend. CLVI, 1913, p. 1275) gives an account of his studies of the behavior of cells in the bracts of *Anthurium* during the formation of crystals. Two kinds of crystals are present: polyhedral crystals which are abundant in the outer cells, and raphides which are found more sparingly and in the deeper cells. In the case of the polyhedral crystals the nucleus retreats to one side of the cell in the densest protoplasm. Striations later pass from the nucleus to the crystals. When the crystals are formed the nucleus is destroyed. A similar fate awaits the nuclei of cells in which the raphides form. In this case however several cells may lose their walls and their nuclei fuse into one. From this the raphides diverge.

ENTOMOLOGICAL NOTES.

A new family of Orthoptera.—Walker ('14, Can. Ent., 46:93-99) reports the finding of specimens on Sulphur Mountain, Banff, Alberta, which represent a new family of the order Orthoptera. The insects are placed without hesitancy in this order since the characters of the mouth-parts, cervical and thoracic sclerites, and ovipositor are distinctly orthopteran. They are wingless, thysanuriform insects of a very generalized type and the discovery of these

unique forms throws additional light upon the phylogeny of the order. Grylloblattidæ, the new family, combines the characters of several different orthopterous families but is distinct from all of them. It seems to be most nearly related to the Blattidæ although in some respects it resembles the Forficulidæ. The ovipositor is regarded as a significant structure, representing closely, in Grylloblattidæ, the same organ in the common ancestor of the three families of saltorial Orthoptera, the Tettigonidæ having departed least from the original type as regards this organ. Grylloblattidæ have been derived from some primitive type of blattid or blattid-like ancestor. These new insects have been named *Grylloblatta campodeiformis,* n. gen. et n. sp.

Inheritance and Evolution in Orthoptera.—Nabours ('14, Journ. Genetics, 3:141-170) in a paper entitled "Studies of Inheritance and Evolution in Orthoptera" reports the results of an extended study on the genus *Paratettix.* The inheritance behavior of the color patterns shows the Mendelian type of inheritance. The great majority of the hybrid patterns show in the visible somatic constitution "all the parts which can be distinguished in the somatic make-up of each of their parent patterns." These grasshoppers show no characters which by crossing can be replaced by other characters but the whole pattern appears to behave as a single unit. Definite variations in the length of wings and pronota are not inheritable but are considered as somatic, resulting from differences in environmental conditions. Protracted conditions conducive to slow growth result in a preponderance of short winged individuals; opposite conditions result in a preponderance of long winged forms. It is suggested that variations in the amount of sunshine in different seasons may account for this form of dimorphism and polymorphism. A large plate in natural colors illustrates many of the points of the paper in a striking way. Nine pure strains and eighteen hybrids resulting from crosses of the former are illustrated.

Distribution of Collembola.—Bacon ('14, Journ. Ent. and Zool., 6:45-57) adds interesting data on the distribution of certain Collembola. *Neapura gigantea* Tull, a very large species which heretofore has been known only from St. Paul Island in the Bering Sea, Northern Siberia, and from the vicinity of St. Lawrence Bay, has

been found in moderate abundance in the vicinity of Claremont, California. It would appear that this species has a very wide distribution.

Cæcal Bacteria and their role.—Glasgow ('14, Biological Bulletin, 26:101-170) has published a very important and interesting paper on "The Gastric Cæca and the Cæcal Bacteria of the Heteroptera." In certain groups of the Heteroptera the digestive tract is characterized by the presence of peculiar sac-like appendages which are associated with the mid-intestine at its posterior end. These organs vary greatly in form, size, shape, number, and distribution in the different families but the histological structure is the same and invariably contain conspicuous masses of bacteria which have been found to be characteristic for families and frequently for the genera in which they occur. Gastric cæca were noted as early as 1809 but cæcal bacteria were not discovered until 1882 when Professor S. A. Forbes found them in the chinch bug, *Blissus leucopterus*. An examination of a very large number of specimens of *Murgantia historionica* from localities ranging from Maryland to California and from the Gulf States to Illinois showed that the bacteria in the cæca of this species are invariably identical. It was found that bacteria are not always present in the cæca of normal bugs. It was also found that infection takes place through the egg, the organisms appearing early in the digestive tract of the embryo. Work on the cultivation of these cæcal organisms showed that they are true bacteria. Critical microscopical examinations of the cæcal bacteria showed that structurally they differ greatly in different hosts "ranging from minute, coccus-like bacteria measuring often less than one micron, to huge, spirochæte-like forms thirty microns or more in length; but in whatever form they occur they are morphologically characteristic for the particular species harboring them." Studies on the functional relation of the cæcal bacteria to the host insect and the importance of the *normal* intestinal bacteria to the host showed that the cæcal bacteria appear to have the power of inhibiting the development of foreign bacteria as well as excluding them altogether. The mid-intestine, which, in many related forms, contains numerous foreign bacteria and protozoa, is free of the latter in species having cæcal bacteria. About ninety species of *Heter-*

optera distributed among twenty-one families were studied in this connection and it was found that the cæcal appendages are apparently of profound phylogenetic significance. They show a "complete gradation from extremely simple to very complex forms and in many cases indicate relationships contrary to those often assumed in the arrangement of groups."

Genera of Noctuidæ.—W. T. M. Forbes ('14, Journ. N. Y. Ent. Soc. 22:1-33) has published a useful paper entitled "A Table of the Genera of Noctuidæ of Northeastern North America." The last general review of the Noctuidæ of this country was published by J. B. Smith in the Bulletin of the Brooklyn Entomological Society in 1882 and is now quite out of date. Although the table is restricted to the genera of a limited portion of this country, it will doubtless be of considerable service to those interested in Lepidoptera and especially to those who do not have access to the extensive works on this order, such as Hampson's Catalogue of the Lepidoptera Phalænæ in the British Museum.

"Aerostatic hairs" in lepidopterous larvae.—Riley ('13, Science, 37:715-716) reports the results of a study of the so-called aerostatic hairs of certain lepidopterous larvæ. These hairs are found on certain larval stages of the gypsy moth and the nun moth and are characterized by globular swellings at the base. As indicated by the name it was originally supposed that these swellings were air reservoirs and that they function as a collection of tiny balloons and played a rôle aiding the dispersal of the species by the wind. It has been shown that the assumption that these swellings are filled with air is erroneous and that instead they are filled with fluid which is very probably poisonous and may serve to protect the larvæ against insectivorous birds. Sections showed a large unicellular gland underlying each so-called aerostatic bristle and opening directly into the cavity. Detailed study also showed that these glands are distinct from the *trichogens,* the enlarged hypodermal cells which give rise to the hairs. It thus seems that these hairs do not function in "rendering the larvæ more buoyant but are really *toxophores.*"

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